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CRITERIA FOR CONTRACTOR SELECTION

Zedan Hatush and Martin Skitmore

ABSTRACT: This paper investigates the criteria currently used by owners and their representatives for selecting bidders and contractors within the UK competitive tendering system. A series of interviews is described with eight different public client representatives and one private client representative with extensive experience in prequalification and bid evaluation processes throughout the north west of England in the North West of England in ?? 1994. The result of this exercise indicates that the main criteria currently in use comprise ??

INTRODUCTION

The failure and success of any project is influenced by numerous decisions made by, or on behalf of, the client. These decisions are taken at different stages of project development, from feasibility studies, planning, design, contractor selection and risk assessment to proper supervision (??WHAT DOES THIS MEAN??) and maintenance. One such decision concerns the prequalification of contractors and the evaluation of bids submitted by prequalified contractors. This is normally carried out by a client's representative and eventually leads to the selection of a contractor to construct the project.

Contractor prequalification is a decision-making process involving a wide range of decision criteria as well as many decision-making parties and has received the attention of several researchers (Moselhi and Martinelli, 1993; Ng, 1992; Herbsman, 1992; Ellis and Herbsman, 1991; Merna and Smith, 1990; Russell, 1988).

The prequalification and bid evaluation processes requires the development of necessary and sufficient criteria. The last two decades has witnessed a huge development in project complexity and client's needs and this has led to an increasing use of alternative forms of project delivery systems. In contrast, the prequalification and bid evaluation process, quantifying and the assessment of criteria is still in its original form.

This paper investigates the criteria currently used by clients for screening contractors and presents the result of an extensive literature review and numerous interviewees with construction professionals who have an extensive experience in prequalification and bid evaluation processes. Here it is shown that the criteria that should be considered during the prequalification and bid process are ??

PREQUALIFICATION AND BID EVALUATION DECISIONS

Prequalification and bid evaluation decisions involve the consideration of three main issues: (1) general information about the contractors, (2) criteria for the prequalification process stage, and (3)

criteria for bid evaluation.

General information

This concerns the administrative information relating to contractors wishing to be considered for inclusion in clients' standing lists. There is very little literature on this subject. Ng (1992) has mentioned only the name of the contractor in his list for gathering data about each contractor for prequalification process. The neglect of this topic seems to be due its administrative nature and its minor affect on the qualification of the contractors.

Criteria for prequalification process

Prequalification is a process used to investigate and assess the capabilities of the contractors to carry out a job if it is awarded to them. The process itself has been examined by many researchers (eg., Zedan and Skitmore 1994; Ng, 1992; Merna and Smith, 1990; Russell 1988). Prequalification provides a client with a list of contractors that are invited to tender on a regular basis. This is the approach most currently used by many countries, and in which many and different types of criteria are considered to evaluate the overall suitability of contractors.

To gain entry to an approved standing list, a contractor applies initially to the client and is then assessed on grounds of financial stability, managerial capability, organizational structure, technical expertise and the previous record of comparable construction (Merna and Smith, 1990). According to Hunt *et al* (1966), it is necessary to consider technical, managerial and financial criteria in the prequalification process. These comprise the applicant's permanent place of business, adequacy of plant and equipment to do the work properly and expeditionary, suitability of financial capability to meet obligations required by the work, appropriateness of technical ability and experience, performance of work of the same general type and on a scale not less than 50% of the amount of the proposed contract, the frequency of previous failures to perform contracts properly or fail to complete them on time, the current position of the contractor to perform the contract well, and the contractor's relationship with subcontractors, or employees.

In contracts without a fixed price, where the clients have no single criteria for selecting contractors, Moselhi (1993) suggests the following four criteria to be essential to the owners objectives: relevancy of experience, depth of organization, financial stability, and safety records.

For planning and tendering the new parallel Runway for Kingsford Smith Airport, where a design and build contract was the method assigned for the project delivery, the following criteria were investigated for selecting the suitable contractor for the job (Herbert and Biggart, 1993):

- Management, i.e. project management structure, human resources and quality management
- Delivery capability and experience, i.e. proposed construction methods and plant ownership, current and completed contracts

- Relationships, i.e. industrial relations, occupational health and safety, and claims and dispute history
- Financial evaluation which was based on an investigation of measures such as net assets, earnings and several financial ratios including debt to equity, current ratio and ability to carry construction losses.

The number of applicants for prequalification is often so great that clients have to reduce the number of contractors to a short list. According to Merna (1990), this process is usually carried out on a subjective basis. The criteria used to narrow down the list might include regional and physical locations, technical and managerial expertise, and type and size of contract.

The short list is then subjected to a detailed investigation to ascertain the current state of the financial, technical and managerial ability of each contractor. The financial investigation involves an update of the financial statements and check on the financial exposure of the company on both domestic and over contracts. Technical assessments are concerned principally with the current commitment of labour and plant resources, the ability to handle the type, quality, size of work, and the ability to perform on site. This is assessed by visits to existing sites and by meetings to discuss, in general terms, the nature of the construction work, the programme dates and the client's requirements. The managerial organization and expertise are considered by identifying the managerial approach to risk, contract strategy, claims and variations. Even if the contractor has previously prequalified for the client, this information needs to be reassessed.

Moore (1985) proposed a quantitative system for fast track projects to select a contractor. Initially, an evaluation team should visit the contractor's home office to collect the required information and assign preliminary scores to each criteria listed in Table 1. Table 1 assigns a maximum point value for each aspect of construction project execution. These values are weighted with respect to their relative importance on the project. when a category is made up of subcategories, the weighted value scores of the subcategories are added to calculate the total value for the category. These scores should never be based on one person's analysis; a minimum of three evaluators is required for each scoring activity.

A study conducted by Severson (1993) investigating trends in contractor financial data to help predict their likelihood of experiencing a claim. The study covered different topics, regarding the assets portion of a contractor's balance sheet, the liabilities portion of a contractor's balance sheet, the stockholders' equity portion of a contractor's balance sheet, the study also covers the contractor's income statement.

Samelson (1982) has focused on construction cost reduction by means of accidents cost control through owner selection of safe contractors. Prequalification criteria are already required by many owners in both negotiated and competitively bid contracts. Including questions on experience modification rating (EMR) and the Occupational Safety and Housing Administration (OSHA) incidence rate, these two criteria would be a means to identify contractors with poor safety

performance and to remove them from bid lists.

Criteria for bid evaluation

The term "evaluation" describes the procedure for the assessment of tender bids submitted by prequalified contractors. The procedures in the UK broadly follow the concepts outlined in guidance notes of The Institution of Civil Engineers (1983), which are concerned with the justification of the lowest priced bid. Several clients however also emphasize the significance of timely completion in the selection of the successful tenderer.

Dennis (1993) suggests preparing a suitable bid list jointly between the engineer and the client. This should include contractors who have previously prequalified. A review of such prequalification records should satisfy both the engineer and the client in that each bidder should have: the financial strength to sustain the cash flows likely to arise during the project; experience of the similar nature of projects, competency and plant capacity to complete the project within the constraints of the likely contract; technical capability (including human resources) sufficient to satisfy the requirements of the contract; a complete understanding of similar project scopes and ability to absorb subsequent changes; the facilities (testing, quality control, etc.) necessary to endorse assurance of quality; and comply in all respects with health and safety regulations.

In a contract auction for a multi-storey office building, estimated at \$10.4 million for construction and \$1.57 million per year for the operation, Moselhi (1993), in consultation with the industry experience, established the selection criteria to be considered for bid evaluation to be: bid amount; annual life cycle cost; number of years in business/bid amount; volume business/bid amount; financial credit/bid amount; previous performance; project management organization; technical expertise; time of execution; and relation with subcontractors.

Herbsman (1992), proposed a multiparameter bidding system for bid evaluation. He suggested considering a major and secondary criteria, the major parameters being: the bid amount; time of execution; and quality of previous work. In addition to the major three parameters of cost, time and quality, there may be secondary criteria that can be incorporated in the evaluation. These criteria and their weights suggested by the client and would be specific to a particular project. Such additional criteria include safety, durability, security and maintenance.

Ellis (1991) proposed a new time/cost approach to determine the winning bidder in highway construction contracts. By this method a road user cost is applied to the contract time proposed by each bidder. Therefore in this case it is suggested that the criteria to be considered are bid prices and contract time (the road user cost is applied to the contract time). By converting the contract time to a cost to the client a straight forward comparison can be made on a single criterion.

A research study conducted by Merna and Smith (1987) for bid evaluation for the public sector in the UK found that clients who require a tender submission of only an initial lump sum price without qualifications would then request further information for a more detail evaluation of the three lowest

bids. Clients who requested a complete package of information check initially for qualification, alternatives and errors before proceeding to a more detailed technical, financial or contractual evaluation to identify the winning bidder.

According to Hardy (1978), the criteria used for bid evaluation should reflect the client's objectives. These are that bids are fully responsive to the contract and bidders are sufficiently well qualified to undertake the contract. The criterion for selecting the successful bidder is then that bid which maximises the return on the client's investment. Thus he is proposed that bidders should submit a schedule of the payments they expect to fall due to them during the contract. Both the client and contractor may use this to determine the bid Present Value.

INTERVIEW FINDINGS

A list of interviewees, comprising of client representatives, was compiled from the RICS list of the 1993 directory and personnel contacts. The interviews were conducted at the offices of eight different public client representatives and one private client representative throughout the north west of England. The interviews were with 9 executives, and ranged from 1 to 2 hours, with each interview being tape-recorded. The 9 agencies comprised one civil engineering, three building engineering,, one landscape, one financial, one safety and health policy, and two list co-ordinators. Table 2 lists the types of personnel interviewed and other information on the types of firms that participated in the interview.

In order to make the interviews more achievable and to save the time of the interviewees, the purpose of interview and the need of the research was identified before the interview through either: (1) a simple list of questions developed and sent to the interviewees (Appendix I); or (2) a telephone conversation. The topics identified from the literature survey were also used in the interviewee process.

During the interviews the interviewees were asked to explain and discuss the current nature of the firm, criteria considered during prequalification process and criteria that are considered during bid evaluation.

General information

General information is obtained from firms wishing to be included on a standing list of approved contractors, usually via a detailed questionnaire from the client. The firms already included on a standing list must also provide all the information required. The information is always treated as a matter of utmost confidentiality and is used only in compiling and monitoring approved lists of contractors.

The application form often includes information relating to:

- Categories of work offered by the client
- Company details
- Scope of work offered by the firm
- Technical resources and references
- Particulars of existing insurances
- Taxation details
- Financial information
- Sub-contracting
- Race relations
- Plant and equipment
- Health and safety

The provision of incomplete information, or failure to enclose the relevant documents, usually exclude consideration for inclusion in the standing list.

Some of the information is used for administrative purposes, the remainder being used for technical and financial assessment. Details of the company are usually requested for administrative purposes although they might be used as an indication of the **place of the firm in the business** (?? WHAT IS THIS??). Typical company details required are given in Table 3.

Criteria for prequalification

The application form is examined by financial and technical experts for the next stage of the assessment.

Technical resources and references

The technical appraisal includes the following criteria:

- Types of work the firm wishes to, and could, carry out which are not covered by the categories offered by the client

- Financial penalties previously levied in respect of failures to perform to the terms of a contract
- Contracts the firm has had terminated or employment determined under the terms of contract
- Contracts not renewed due to failure to perform in accordance with the terms of contract
- Suitability and competence of potential employees. This involves the consideration of job descriptions, application forms, references, qualifications, inspections of previous work, trial periods before confirmation of employment and personal recommendations.
- Skills including professional, managerial, and technical expertise, that are available to the company, e.g. qualifications and relevant experience
- Staffing levels in the company including management, professional/technical, administrative/clerical, manual supervisor, etc.
- Currency of records of employees
- Names, addresses and details of work carried out recently for public sector clients other than this authority, including supervising officer, contract title, tender price and type of work.
- Contracts carried out for the client in the last 3 years
- Main plant and equipment owned by the company.

An initial assessment leads to a reduced number of contractors followed by a detailed investigation involving requests for information from referees. Here, information on different criteria is requested and different methods of judgment are used. Table 4 shows a points system used by one of the interviewees.

Another uses a cardinal system for which the technical information requested is shown in Table 5. In this case the technical reasons for rejecting applications include

1. Unsatisfactory work or performance on a contract for the client within the last 5 years.
2. Unsatisfactory work or performance on a contract for any other Authority or company.
3. No previous experience in the category of work applied for.
4. Habitually submits excessive claims.

5. Declined invitations, or did not submit a tender on at least three occasions in the previous 12 months.
6. Inadequately staffed reception arrangements for telephone message at Head Office.
7. Inadequate plant resources.
8. Likely to cause additional cost to the client in supervising contracts because of inadequate arrangements for Head Office or site management.
9. Disregard for the Conditions of Contract or instructions given by, or on behalf of, the supervisor.

Financial criteria

The financial criteria that are investigated in the prequalification stage include (?? THIS ALL SEEMS TO BE 'INFORMATION' ONLY - WHAT IS THE UNDERLYING CRITERIA IT IS USED TO ASSESS??)

- (?? COMPETENCE OF ??) person in the firm responsible for the financial affairs
- Name and address of the firm banker (??WHAT ABOUT THE BANKER??)
- Copies of unmodified audited accounts and annual reports for last 3 years, including
 - Balance sheet
 - Profit and Loss account
 - Director's Report/ Auditor's Report
 - Confirmation that the company is still trading
 - A statement of turnover since the last set of published accounts
 - Details of any outstanding claims or litigation against the company

The detailed financial assessments are carried out by the client and by contacting private companies (such as Dun & Bradstreet in the UK) dealing with the updated financial status of the companies. Table 6 provides a simple example spreadsheet of the analysis of financial trends of the contractors.

In addition to the technical and financial assessment for the prequalification process, applicants have to provide a health and safety policy. This should cover the names of personnel responsible for implementation of the policy, number of employees, procedures to convey the safety policies to the employees, procedures for reporting and recording the accidents, first aid provision and details of prosecutions served on the firm by health and safety executives. Other criteria considered in the prequalification process include particulars of existing insurances, taxation, sub-contracting and race

relations.

Criteria for bid evaluation

When the contractors are prequalified, they are placed on a standing proved list for invitation to tender on a regular basis. The procedure for inviting contractors are different from one client to another with some using a random base system and others using a reputational system where four to six contractors only are invited to tender. Other clients use a points system in which the list of approved contractors are invited to tender through an advertisement in a press. In this case, those who are willing to tender and receive the full package are selected on the basis of a points score with the highest six scorers given the chance to tender. Table 7 provides an example of this system and the criteria that are considered in selection.

In all cases the final and the only criterion that is currently used to decide the winner of any contract is the bid price. The bidder tendering the lowest price is always the one who is assigned and awarded the contract.

Since the winning contractor is decided by the client, final checks and a pre-award meeting are normally carried out to clarify the technical, safety, and risks associated with the construction. The technical and financial criteria is also covered. The points that are checked by the safety officer during the pre-award meeting include company safety policy, Method Statement, F10 notices used in the UK for the contracts over 6 weeks duration, job flow charts, welfare provisions, electricity regulations, IE ELCB or 110 V Transformers, Health and Safety Information charts for employees, accident books, excavations weekly examinations, reports of tests (sites), lifting appliances, weekly inspections and test reports, scaffolding weekly examinations, cranes, eye bolts certificates of test and examination, underground services and drainage connections.

RECOMMENDED CRITERIA

Failure of contractors to comply with the contracts conditions occur for different reasons. The authors have addressed these kind of problems and their causes elsewhere (Zedan and Skitmore, 1994). In fact there is no sharing of information between clients, specifically between those where a contractor is working for each at the same time. Each client treats and categorises contractors differently.

The main cause of problems seems to be the existing workload of the contractor at the time he is awarded a new contract and this has to be checked carefully as it can lead to other problems. Existing workload, therefore, is one of the criteria to be considered during bid evaluation. In addition to the criteria found from the literature and interviews, the following criteria are also used

1. Quality assurance in accordance with BS 5750 for Design and Construction

2. Workload the contractor has on site
3. Experience of working on projects of a similar nature
4. Experience of working with the owner, i.e., understanding of the owner's procedures in meetings and for payments. Public owners are quite different in this respect to private owners
5. Financial stability
6. Local knowledge
7. Responsible attitude towards the work.

CONCLUSIONS

The new and fast developments and needs in different aspects of human life, has lead the professionals in construction industry to use alternative forms of project delivery systems, but the tendering and awarding systems are still largely in their original form. The insufficiency and inappropriateness of the awarded contractor has lead to sub-standard work, delays, disputes, or even bankruptcy.

If a client wishes to cope with these new developments and invite acceptable bidders, it is necessary to clarify and develop pre-determined selection criteria and the objective of the prequalification and bid evaluation processes. This paper describes the criteria being used currently in the prequalification process and bid evaluation by the public clients. The authors also recommend some criteria to be stressed and considered more carefully during the prequalification process.

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Appendix I. List of questions discussed during the interview.

Questions related prequalification processes and bid evaluation discussed during the interview:

Q1The first question will be about the position of the interviewee, the firm and its activities, contractor selection, and involvement in bid evaluation.

- Q2**What are the criteria that are currently considered by the firm during the prequalification process?
- Q3**What is the objective of the client in the prequalification process, and what are the criteria that are considered for special circumstances i.e. projects of large size and value?
- Q4**What criteria are used in bid analysis and evaluation?
- Q5**Which of the criteria considered of more important than others, can you rank order these criteria?
- Q6**What is the current method or methods being used for bid analysis?
- Q7**What type of problems if any, have you experienced during the project execution period caused by the contractor not being capable of carrying out the job within the contract conditions?
- Q8**Do you think the methods used currently for bid analysis are capable of identifying the most suitable and favourite contractor?
- Q9**What other criteria do you think should be included in the prequalification process, and what other methods might be considered better for bid analysis?
- Q10**Do you have any other comments related to the prequalification process and bid evaluation you want to add?

Maximum points	Category or criteria
5	Craftsmen availability
5	Training or skill level of craftsmen
	Supervision
	80percent-interviews and reference checks on 8 to 10 key people
25	10 percent-foreman quality and training
	10 percent-foreman availability
10	Productivity improvement programme
25	Systems and procedures
	Cost, schedule, material control, personnel, accounting, subcontracts, purchasing, safety
	Field organization, work rules, work policies
5	Safety record
3	Geographical experience
2	Experience with the specific type of facility
3	Quality control
5	Home office support
2	Executive involvement-leadership
2	Small tools and construction equipment (condition and procedures)
5	Engineering coordination
<u>3</u>	
100	

Source: Moore (1985)

Table 1: Relative importance of project execution factors

Interview date	Position	Type of firm	Sector
01-13-91	Select list co-ordinator	Technical and consultancy division (client representative)	Direct works Civil Engineering Building Engineering
01-14-91	Office Administrator	City Architect Department.	Building Engineering
01-19-91	Practice Manager	Architect Division	Building Engineering
01-21-91	Quantity Surveyor	Technical and Consultancy division (area office)	Building Engineering
01-22-91	Architect Engineer & owner representatives	Consultant	Building
01-24-91	Chief Assistant Engineer	Civil Engineering Division	Civil Engineering
01-26-91	Chief Engineer	Architect Department, landscape division	Building
02-03-91	Director of Accountants	Finance Department	Building, civil, and direct Engineering works
02-10-91	Health and Safety Officer	Health and Safety Section	Building, civil, and direct Engineering works
02-24-91	Architect Engineer & owner representatives	Consultant	Building

Table 2: Types of firms interviewed

Full name and status of company	
Local address Telephone number	
Registered office Address if different from above	
Date company established	
Company registered number(indicate Public, Private or co-operative)	
Co-operative companies must comply with ICOM Model rules	
Date when last company accounts were registered and the financial year to which they relate	
Parent company (if applicable)	
Nominal and paid up share capital	
Managing Director	name and tel No.
Person dealing with the application on behalf of the company	Name and Tel No.
Description of the company/firms business activities. Please confirm that the objects of the company stated in its memorandum of association cover the purposes for which this list is being compiled	
SOLE TRADER/PARTNERSHIP	
Full names of Proprietor or every partner	
Date of formation or commencement of trading	
Person dealing with this application	Name and Tel No.
Description of the business activities	
FOR ALL FIRMS	
List the names of every Director, Partner, Associates and company secretary	
Have any of the directors, partners or association been involved in any firm which has been liquidated or gone into receivership?(give details)	
Has any Director, Partner or Associates been employed by the client?details required	
Is any director, Partner or Associates relative to any of client employee	

Table 3: General information about the contractors

		Points out of 20
1	Planning, Programming and General Progress.	
2	Site organisation and Supervision.	
3	Quality of Workmanship.	
4	Adequacy of labour force and plant.	
5	Responsibility and consideration for the general public. Responsibility and consideration for the adjoining owners affected by the work.	
6	Signing, lambing off and watching. Taking of adequate safety precautions on the work.	
7	Willing to effect remedial works which were required during the defects liability period.	
8		
	Interim and Final Accounts:-	
9	Presentation Settlement	
10	What was the contractor's attitude with regard to claims?	
11	Justification Documentation Settlement Any other comments regarding claims.....	
12 13 14	Relations with Statutory Undertakers Working relations between members of the referee staff and the staff of the firm including head Office staff.	
		Total score out of 320
15 16	Percentage of work sub-let Details..... Standard of Sub-contractors work: Points out of 20	
17		
18		

20 points=outstanding, 15 points=good, 10 points=satisfactory, 5 points=poor, 0 points=unsatisfactory

Table 4: The point system used for requesting technical criteria

1. Type of work has the firm carried out for the referee	
2. Value of work has the firm carried out for the referee	
3. The quality of workmanship was:	Poor/Average/Good.
4. The referee relationships with their management were:	Poor/Average/Good.
5. Their site organisation and programming were:	Poor/Average/Good.
6. Compliance with specification was:	Poor/Average/Good.
7. Did the firm have difficulty providing adequate labour?	YES/NO.
8. Was the contract completion date achieved?	YES/NO.
9. Has the firm completed defects to the referees satisfaction	YES/NO.
10. Were damages for non-completion ever applied?	YES/NO.
11. Relationship with sub-contractors and suppliers generally	Good/Avg/Por.
12. Were nominated sub-contractors paid promptly?	YES/NO.
13. Was the final account settled amicably without undue claims	YES/NO.
14. Did the contractor have a tendency to make excessive claims?	YES/NO.
15. Do the referee consider this firm capable of undertaking the work assigned to him?	YES/NO.
16. Would the referee employ this firm again if the occasion arose?	YES/NO.
17. Any further comments which would be helpful	

Table 5: Technical information requested for cardinal system

Narrative	YEAR 3	YEAR 2	YEAR 1
Date		31/3/91	31/3/90
Turnover		£215532	£152652
Gross Profit		234579	192962
Trading Profit\ Operating Profit		14553	4943
Totals Assets Less Current Liabilities		65392	4516
Stock & Works in Progress		2000	4631
Current assets		521601	336953
Current Liabilities		516319	331122
Current Assets less stk & wrks in Prog	0	522601	332322
Debtors		27903	25572
Creditors		516319	331122
Contract size		200000	200000
RATIOS:-			
Return on capital employed	ERR	21.95	10.19
Gross profit as a percentage Turnover	ERR	11.08	12.76
Trading profit as a percentage turnover	ERR	0.68	0.33
Work per £ of capital employed	ERR	32.35	31.18
Current ratio	ERR	101.6	101.76
Quick ratio	ERR	101.21	100.36
Debtors: Creditors	ERR	52.66	65.1
Contract size to turnover %	ERR	9.45	13.22
Comments:-			
Ratios			
Turnover			

Table 6: Example spreadsheet of the analysis of financial trends

Project Estimated Value £

1.Location: within the client region, 4 points; up to 20 miles, 3 points; 20-40 miles, 1 point

2.Annual turnover: 2-3 times estimated value, 1 point; 3-6 times estimated value, 2 points; over 6 times estimated value, 3 points.

3.Trades Employed: (??)

4.Experience: at least £... 1 point for each similar project, with a maximum of 8 points. Note that some aggregation of smaller projects is permissible but only when firm has only done projects of similar value

5.Work in public sector: a maximum of 2 points for comparable projects in public sector

6.Safety: If safety policy was reviewed within 1 year of form date - 1 point.

7.Performance with this authority: assessment of quality, attitude, time, etc, max 3 points.

FIRM	1	2	3	4	5	6	7	TOTAL	DECISION
A									
B									
C									
D									

Table 7: Example of project advert system and the criteria considered